B-Hill Consulting Engineers

Report Number 44-22003

<u>Building Damage Evaluation</u>

Prepared for:
Dugas & Circelli, PLLC
1701 River Run
Suite 703
Fort Worth, Texas 76107

Location of Property:
Colston Building
10 West Main Street
Ardmore, Oklahoma 73401-6516

Insurance Company:
EMC Insurance Companies
PO Box 1739
Wichita, Kansas 67201
Claim Number: 1631462
DOL: August 16, 2020

Prepared by:

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4/19/2023

This item has been electronically signed and sealed by Bryan C. Hill, P.E. using a Digital Signature and date. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Bryan C. Hill, P.E.

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Results and Conclusions

Based upon the information obtained and considered to date, we offer the following opinions:

1. The physical evidence observed and measured at the property was consistent with severe winds ($\geq$58 mph) associated with the hail event on August 16, 2020, which more likely than not caused physical damage and necessitated the repair/replacement of the damaged building components. The physical damage included wind borne debris that impacted the west-facing side of the south penthouse and caused a broken window pane, indentations in the window frame and adjacent man door, and mechanical indentations in the cell tower conduit large run cover.
2. The physical evidence observed and measured at the property was consistent with large damaging hail up to 2 inches in diameter associated with the reported hail event on August 16, 2020 which more likely than not caused significant physical and functional damage to roof coverings and components and necessitated the repair/replacement of the damaged building components.
   a. The physical damage to the metal components included spherical indentations in the RTU metal covers, grills, and condenser fins, rigid ducts, metal panel awnings, window frames, appurtenances, aluminum window sill coverings and trims, flashings, drive through signage cover, and gutter. The hail-caused indentations have reduced the value of these building components.
   b. The functional damage to the glazed terra cotta tiles included fractured and spalled glazing with exposure of the terra cotta. The hail-caused fractures have reduced the value of these building components, shortened the useful life, and create a potential fall hazard to the public below as the terra cotta is exposed and subject to deterioration. These glazed terra tiles are not part of the roofing system.
   c. The structural damage included a reduced service life of the roof from 1 or more of the following: displaced granule and bitumen cover, exposed bitumen, exposed reinforcement, dented, bruised, and fractured reinforcement mat, and breached condition of the roofs over the penthouses, 6th story and 1-story roofs.

The fractured surfaces were a breached condition where water had migrated past the bitumen and mod-bit roofing membrane.

3. The physical evidence observed and measured at the property indicated that water migration past the roof had occurred at the Colston Building as a result of the wind-borne debris penetrations and hail-caused breached roofing systems.
    a. Water damage to the penthouses and 6th floor offices was the direct result of the weather event on August 16, 2020. The water damage on the 1st floor bank, bank offices, hall, and bank filing room could not be definitively traced back to a weather created opening.
4. The physical evidence observed and measured at the property indicated that there was no damage to the TPO roofing membrane.
5. All opinions and conclusions rendered herein were based on a reasonable degree of engineering certainty.

Introduction

Pendant Properties, LLC reported weather damage to the Colston Building located at 10 West Main Street in Ardmore, Oklahoma. The specific condition reported was that the roof coverings and exterior cladding of the building were damaged by a weather event and that the weather created openings had resulted in water damage to the interior.

Bryan C. Hill, P.E. was retained by Dugas & Circelli, PLLC to perform an evaluation of the roofs, exteriors, and available interiors and to determine the cause and extent of the reported conditions. Additionally, if the damage was deemed weather related, determine the most likely date the damage occurred, and reasonable scope of repair. Work to complete this assignment was performed by Bryan C. Hill, P.E. Pendant Properties, LLC owner, Ms. Jeri McKenzie and her representatives, Mr. Terry McKeever and Mr. Duane Smith, were present during the inspection of the property on July 20, 2022. All measurements and data cited in this report are considered to be approximate values.

Background Information

According to the Carter County Assessor (CCA) online records, the commercial office and restaurant structure at 10 West Main Street was constructed in 1925 and had 10,957 square feet of adjusted area. Building placard indicated building construction was in 1918. Based on the CCA's records, Pendant Properties, LLC has owned the property since April of 2020.

Bryan C. Hill, P.E., inspected the subject property on July 20, 2022. During the inspection, we found that the roof coverings had sustained storm damage and that there were interior leaks at the hotel and restaurant structures. Ms. Jeri McKenzie reported that the building was impacted by a weather event in August of 2020 and that there were water leaks on the interiors within the office spaces resultant of the weather event. Ms. McKenzie reported that the broken glass pane and the door damage on the penthouse was not present prior to the last wind event. Ms. McKenzie reported that the cell tower was scheduled to be removed around the end of July, 2022.

A copy of the commercial property endorsement *Limitations on Coverage For Roof Surfacing* for policy number CP 10361012 dated 2011. A copy of the EMC Insurance Companies (EMC) coverages letter dated April 2, 2021, *Statement of Loss* by Premier Inspection Services, Inc. (PIS) dated March 15, 2021, and an *Inspection Report* by Engineering Inc. (EI), dated February 23, 2021 was provided for our review.

Site Observations

The Pendant Properties, LLC Colston Building property was a 6-story commercial building that accommodated office suites, a bank, a restaurant, and an attached storage building. The building was constructed with cast in place concrete framing for the roof deck, floor deck, and wall structures, with load bearing brick and block masonry walls, and a concrete slab-on-grade and spread footing foundation at the basement level. There were 1-story roofs over the restaurant, hallway, storage, and a portion of the bank offices. The flat roofs were covered with gravel ballasted built-up roofing (GB BUR) with modified bitumen (mod-bit) and bitumen built-up parapet wall coverings. The building exterior was clad with brick, enamel covered architectural terra cotta tile features, and Carthage grey marble.

There were awnings at the front, right, and rear sides of the building covered with GB BUR, metal panels, and single-ply roofing. Parking areas were constructed on the front and rear sides of the building. For purposes of this report the front of the building faced north.

We inspected the roofs, exteriors, and a portion of the interiors of the structure. Destructive testing was not completed during our evaluation.

Our inspection of the main flat roofs over the structure identified rectangular roof structures including 2 penthouse roofs, the 6th story roof, and the 1st story roofs. The perimeter parapets of the penthouses and 6th story roofs were covered with bitumen over a reinforced mesh that transitioned to the GB BUR. We noted mod-bit roofing on the curbs of the 1st story roof as a transition from the bitumen over reinforced mesh parapet wall covering to the flat GB BUR. The penthouses supported cell towers on steel frames that were counter balanced from overturning with concrete masonry unit (CMU) block. The steel frames were supported on multiple 4x4 sleepers over the GB BUR. The penthouse roofs concentrated rainwater runoff into west-facing through wall scuppers that discharged onto the 6th story roofs below, and the 6th story roofs discharged through roof drains. The 1st story roofs discharged to roof drains with the exception of the lower 1st story roof where water was collected in a sump then pumped to the upper roof surface for discharge into the roof drains.

We inspected the roof top units (RTUs) and found spherical indentations in the metal covers, fan grills, and exposed condenser fins up to 1.5 inches in diameter. The larger spherical indentations in the coil fin were shiny. Some of the condenser fins were torn at the point of impact. We identified spherical indentations on the tops and sides of the rigid ducts. We noted numerous slightly oxidized, dull burnish marks coincident of the large indentations that had a light soiled appearance. We found burnish marks up to 3/8 of an inch on some of the metal surfaces. We noted an inward impact fracture to 1 of the penthouse fire rated windowpanes, linear dents to the adjacent window frame, and on the adjacent man door. We noted mechanical impact dents to the cell tower conduit run covers.

We identified spherical fractures in the architectural glazed terra cotta tiles consistent with impact that covered the 6th story parapet walls and lower protruding wall features. The terra cotta tiles were not part of the roofing surfacing system rather an architectural feature that projected out from the building exterior cladding. The fractured glazed coverings were spherical around the impacted locations and the spalled impact locations exposed the terra cotta content of the tiles. The exposed terra cotta in the spherically impacted tile locations had a consistent light soiled appearance. We found linear and irregularly shaped displacement of the glazed surfaces where the glazing was not spalled, yet was crazed and debonded from the terra cotta, and had no indication of impact. We identified fractures along the perimeter edges of the glazed terra cotta where mortar was finished into the exposed fracture.

We identified spherical indentations and fractures on the parapet tops and sides consistent with large damaging hail up to approximately 2 inches in diameter that were through the bitumen and the reinforcement mat on the parapet walls. The fractures through the bitumen exposed the reinforcement and the metal curb coping along the

penthouses that was constructed as a transition from the parapet to the roof plane. We identified spherical fractures on the repaired areas of bitumen that extended over the GB BUR. We conducted moisture measurements using a Tramex moisture meter and found elevated levels of moisture up to 23 percent around the base of the flagpole adjacent to a spherical fracture in the bitumen. We noted in several areas the GB BUR was flexible under foot pressure, we pushed back the loose gravel covering in these areas and identified some of the bitumen that retained the gravel ballast had been fractured. The fractured edges were shiny in comparison to the adjacent areas that were not fractured.

We noted spherical impact marks on the mod-bit roofing at the curb transitions from the parapet to the roof surface at the roof over the 1st story and on the storage area. The marks had displaced granule coverage and exposure of the bitumen.

Our inspection of the exterior found spherical impact dents with slightly oxidized, dull burnish marks in the metal panel awnings at the south and west sides of the building, in the metal flashing transition from the wall and the perimeter to the GB BUR over the awnings on the north side of the building, and in the gutters. We identified a few indentations that had heavily soiled interiors at the indentations on the metal panel awnings. We found bright burnish marks up to approximately 3/8 of an inch on the metal electrical boxes and some of the metal surfaces. The metal flashing along the perimeter wall at the north awnings was covered by marble panel side cladding. We noted spherical fractures in the bitumen along the transition from the perimeter edge of the north awnings to the metal flashing over the GB BUR. We identified water stains on the underside cladding of the north awnings.

We found spherical impact dents in the fire rated window frames from the vantage point of the 1st story roof. We noted spherical impact dents in the aluminum sill coverings along the windows on the south and west sides of the building. We identified spherical impact dents to the metal panel signage cap over the drive through window awning up to approximately 0.8 inches in inside diameter and 2.0 inches in outside diameter. The TPO roofing membrane over the drive through had an electrical penetration boot flashing that was date stamped July of 2010.

Our inspection of the interior was concentrated to the offices along the 6th floor building perimeter, the bank and bank office areas, the restaurant, and the basement. Water migration into the building occurred along the perimeter 6th story walls of the building. Water migration was noted in offices 603, 604, 606, 611, 614, 616, and 619. We noted water stains and displaced paint on the ceiling / roof deck concrete, water-stained and buckled wood paneling, water-stained fiberboard wall cladding, water-stained light fixtures and electrical outlets, water-stained counter tops and trims, water-stained base trim, and floor coverings. We found water stains and finish distortions at the northwest corner of the bank. We identified water stained and partially missing ceiling tiles in the hallway, filing room and office within the bank office area. Penetrations above the bank hallway and bank office were the locations around where water migrated into the interior from the roof. An area of water migration into the office filing area identified a hole too small in a non-removable ceiling tile to further investigate without destructive testing. Water stains on the floor coverings and base trim were noted in the office filing area.

Weather Information

Utilizing database records from National Centers for Environmental Information (NCEI) Storm Events Database (SED), we conducted a survey of the hail events in Carter County, Oklahoma, from January 1, 2011 through July 20, 2022. The closest weather reporting station was located at the Ardmore Downtown Executive Airport (53929), located approximately 1.5 miles to the south-southeast from the property. There were 49 thunderstorm wind events over our research period. We identified 4 thunderstorm wind events within a 2-mile radius from the property during the research period with wind gusts reported up to 57 mph. The closest wind event was this reported 57 mph approximately 928 ft south-southwest from the property. The other 3 thunderstorm wind events were all 56 mph, 2 on May 19, 2015 approximately 0.6 miles west-southwest from the property and the most recent was 56 mph on July 10, 2021 approximately 1.8 miles west-southwest from the property (see **Table 1** below).

There were 93 hail events within Carter County over our research period with hail reported up to 4.5 inches in diameter on May 22, 2011 in Lone Grove. We identified 6 hail events within a 2-mile radius from the property during the research period with hail diameters reported from 1.0 inches to 1.75 inches in diameter. The latest hail event reported was 1.75 inches in diameter on August 16, 2020 approximately 0.6 miles west-southwest from the property (see **Table 2** below). This same diameter of hail was reported in 2011 and 2013 both located 0.6 miles west-southwest from the property. It is not uncommon for reports to be more than a few miles from the property as NCEI relies on trained weather spotters, social media posts, and other means of reporting hail events, which does not typically place hail at the property. This weather data is used to confirm the findings from our inspection at the property. The episode narrative of the hail event on August 16, 2020, reported *A weak surface boundary served as a focus for thunderstorm development during the afternoon of the 16th across southern Oklahoma and western north Texas with numerous severe wind and hail reports were received.*

Table 1: Wind Events Within 2.0 Miles from the Property

Date	Wind Speed (mph)	Distance (mi) / Direction
8/16/2020	$\geq$ 58*	0.6 / WSW
7/10/2021	56	1.8 / WSW
5/19/2015	56	0.6 / WSW
5/19/2015	56	0.6 / WSW
5/29/2013	57	928 ft / SSW

*From "severe wind" on NWS hail report episode narrative.

Table 2: Hail Events Within 2.0 Miles from the Property

Date	Diameter (in.)	Distance (mi) / Direction
8/16/2020	1.75	0.6 / WSW
6/23/2017	1	2.0 / W
5/29/2016	1	0.5 / N
4/11/2016	1.25	1.2 / N
3/31/2013	1.75	0.6 / WSW
5/22/2011	1.75	0.6 / WSW

Wind Damage Research

Severe winds can affect all types of roofing material. Functional damage to roof coverings is defined as diminution of water-shedding capability or a reduction in the expected service life of the covering. Wind uplift pressures are a function of wind speed and the roof height above the ground. The resultant uplift pressures are highest at the eaves, ridges, hips, and at building corners of the roof.

Functional damage to low sloped roof systems caused by exposure to wind pressures typically consist of lifting the membrane from the surface, tearing along the perimeter or seam edges, withdrawal of fasteners, lifting, separating back from the edges, and membrane blow-off. After an opening occurs, there is a breach in the roofing where water can migrate past the roofing membrane and damage the substrate. Once the roofing system is compromised, the failure is cascading, and large sections of the roofing can be peeled back.

Wind pressures can mobilize items like mechanical, electrical, and communication equipment, and other rooftop equipment or covers on appurtenances and cause drag gouging, impact damage, and penetration even before wind speeds attain the velocity necessary to damage roofing. Functional damage can occur from wind driven debris impact or dragging of objects across the roof that gouge and penetrate the roofing membrane creating a breach in the surface. More recent tearing and penetrations of the single-ply will reveal brighter reinforcement fibers (scrim) where older tearing will reveal discolored or deteriorated single-ply scrim. Single-ply membranes void of reinforcement can display tears. According to National Severe Storms Laboratory (NSSL), a branch of NOAA, damaging winds are classified as those exceeding 50-60 mph.

Functional damage to metal panel roofing caused by wind pressures typically occurs in a zippered rolling back of the metal panels as the fastener pulls through the metal panel. Kinked, sharply folded panels, tearing, or cracks around the fastener head are an onset to fastener pull through where the metal panel has remained attached to the roof yet is still functionally damaged. Winds of sufficient magnitude to separate the metal from the roof typically cause tearing of the metal material along the fastener head then bending of the metal around the remaining fasteners. The noted hinging can cause creases in the metal that functionally damage the metal panel and can eventually cause tearing and displacement of the metal panel. Single fold over or multiple creases will typically develop from fatigue as the metal hinges in response to repeated loading from wind pressures during 1 or multiple storm events over the life of the metal panel. More recent creasing and tearing of the metal panel will reveal shiny fractures in the surface around the point of fatigue where older creasing and tearing will reveal rust coating along the fractured surface coatings if iron is present in the metal. Separation of the seams where water can migrate past the roof panel is considered functional damage. Functional damage can also occur from wind borne debris impact. Impact to the seams of the metal panels can lift the seam or deform the overlap and cause a breach in the roof such that water migration past the roof can occur. Additionally, impact by wind borne debris can displace the protective coating and cause an exposed unprotected area on the roof. This unprotected area where the coating was displaced has a greater probability for rust oxidation and shortened service life.

Hail Damage Research

Functional damage to roof coverings is defined as diminution of water-shedding capability or a reduction in the expected service life of the covering (Marshall and Herzog 1999). Hail damage to a low sloped roofing system is dependent on hail size, impact energy, density, roof type and condition. Available research information indicates that hail impact damage to modified bitumen (mod-bit) roofing is characterized by breaking of the surface coating (asphalt) along with fracturing of the roofing membrane or exposure of membrane fibers. Hail caused fractures, not always obvious in roof surfaces, can be detected by hand and feel like localized soft spots or "bruises". Separation of the membrane may be necessary to evaluate internal product damage. There are 2 components required for a granule and asphalt covered mod-bit roof covering to be considered functionally damaged. The first requirement is that there is a spot of missing granules that exposed the asphalt saturated fiber mat, and the second requirement is that there be a bruising or fracturing of the asphalt saturated mat as a result of an impact to the roof covering. Pushing against the surface and noting a soft spot is an indication of damage to the fiber mat reinforcement. Granule displacement that exposes the bitumen layer constitutes a reduction in the membrane's weather-proofing capability. The service life of these roofing systems can be affected when the protective surfacing is dislodged by hail. Examples in mod-bit roofing include disrupted membrane surfacing and exposed coating bitumen. Laboratory testing for functional damage to various roofing materials from hail impacts indicates that the lower threshold for functional damage to a granule coated mod-bit roofing membrane is 1.5 inches in diameter. This lower threshold is a "worst-case scenario" as the hail balls used in the laboratory were developed in a freezer resulting in an ice ball that is typically denser than those developed naturally during weather events.

Laboratory testing of mod-bit roofing membranes is typically conducted under the ASTM D7636M-11 (2019) *Standard Practice for Sampling and Analysis of Modified Bitumen Roof Systems* and the ASTM D3746-85 *Standard Test Method for Impact Resistance of Bituminous Roofing Systems*. This testing method is typically employed on the mod-bit roofing membrane samples. The latest update to the ASTM D7636M-11 occurred in 2019 and ASTM D3746-85 occurred in 2015. The ASTM D7636M-11 standard provides the scope and procedure required for removing and evaluating specimens from existing built-up roofing membrane systems. The sample removal specification of ASTM D7636M-11 procedure is defined in section 4 and section 7. The report for sample evaluation is described in section 8. This standard requires documentation of the sample during removal, the substrate, location, and conditions. Laboratory testing would provide analysis including separation of the reinforcement layers typically by heating or freezing, and inspection of the bitumen between layers for abnormalities including but not limited to voids, blisters, mole runs, wrinkling, shrinkage, excessive wear, bitumen indentations, depressions, tearing, fractures, or penetrations. Laboratory testing has shown that even after ply separation, oftentimes desaturation (per the ASTM D3746-85 (2015) damage assessment section 10.7) was required to determine if the reinforcement mat was fractured. Desaturation provides a bitumen free reinforcement mat such that visual confirmation can be made regarding fractures in the mat.

Available research information indicates that hail impact damage to TPO roofing membranes includes cracks, splits, punctures, and fractures. Weathered TPO roofs are

more vulnerable to damage caused by hail impact. Impacts above mechanical fastener plates is a location of TPO susceptibility. Impacts above these plates are known as "anvil strikes" and can result in arc-fractures typically 1/16 to 1.0 inches long. Hail impact damage will typically exhibit fractures similar to a star shape in an unreinforced TPO membrane and can exhibit concentric circles or arc fracture in a reinforced membrane. Once the scrim is exposed, the membrane is breached. Additionally, impact from hail that can damage the membrane will often cause a round indentation below the fracture in the insulation board. Insulation that is dented or fractured may constitute functional damage. FM 4473 failure criteria relates to membrane failure because cracks to the reinforcement fabric in the case of TPO or PVC membranes can lead to leaks (Bhawalkar, Taylor, Yang 2016). Laboratory testing for functional damage to Thermoplastic TPO membranes from hail impacts indicates that the lower threshold for functional damage is 1.0 to 1.5 inches in diameter.

Available research information indicates that hail impact damage to metal panel roofing occurs when the metal is fractured, bent, or penetrated or is subjected to corrosive oxidation in such a manner that rainwater discharge can migrate past the roof. According to industry standards describing hail damage to metal panels, UL 2218 considers failure as tearing, fracturing, cracking, splitting, rupture, crazing or other evidence of opening through the roof covering, ANSI/FM_4473 considers failure as visible cracking or breaking. Metal panels manufactured with iron content and a Galvalume coating will produce a rust oxidation at the point of impact if the Galvalume is fractured causing an increased rate of premature failure of the metal panel. Impact dents in a metal panel that do not deter the water shedding ability are considered cosmetic yet retain the signature of physical damage.

Diameters of indentations of tested sheet metals were smaller than the diameter of the impacting ice spheres (Crenshaw and Koontz 2002). Laboratory testing of metal panels involves a scanning electron microscope (SEM) and energy dispersive spectroscopy (EDS) of metal samples to determine if the Galvalume steel coating was fractured exposing the iron in the steel substructure of the metal panel. This testing had identified functional damage to steel panels will not be immediately visible shortly after a smaller hail event occurs.

Available laboratory testing has indicated discrete numbers of simulated hail impact dents to air-conditioner condenser coil fins have minimal effect on the capacities until a threshold of approximately 47 percent coverage is reached (Stitzmann, Lu, Smith 2007). However, the presence of unrepaired dents in coil fins obscures future hail impact evaluation. Dents in coil fins are typically 80 percent of the hailstone diameter (Morrison 2009). The dents to the A/C coil fins can be straightened/corrected via mechanical combing. Pre-combed fins that exhibit fracture will not sustain additional combing without damage to the fins and therefore require replacement.

Analyses and Discussion

Our evaluation of the Colston Building was primarily to determine the extent and cause of damage, the date the damage occurred, if the roof can be feasibly repaired, and to provide effective repair / replacement recommendations. To facilitate the scope of the Colston Building evaluation, and as a basis for this report, we provided forensic

engineering services as required for analysis of the structure and reported damage to the property.

Pendant Properties, LLC reported that the roof assemblies at the property were damaged by a recent storm event in August of 2020 and subsequent water damage was believed to be associated with this storm event. Our weather research revealed 4 reported thunderstorm wind events and 6 reported hail events within a 2-miles radius of the property. The most recent reported thunderstorm wind event was 56 mph on July 10, 2021 approximately 1.8 miles from the property. The most recent reported hail event was 1.75 inches in diameter hail on August 16, 2020, approximately 0.6 miles west-southwest from the property. The hail episode narrative for this hail event indicated the thunderstorm development during the afternoon was across southern Oklahoma and western north Texas with numerous severe wind and hail reports.

Our inspection of the roof and exterior of the building from the roof perspective revealed impact had fractured a penthouse window pane, caused linear indentations in the window frame and on the man door at the west-facing side of the south penthouse, and caused mechanical impact indentations in the cell tower conduit run covers. The broken glass pane was fire rated glass with wire embedment. The break in the pane of glass was inward indicating the impact was from the exterior of the penthouse and aligned with the indentations in the window frame. Similar width of linear indentations were noted in the man door. The broken window pane, indentations in the window frame, man door, and in the conduit run cover were consistent with debris impact resultant of severe wind. Ms. McKenzie had reported to us during the inspection that the broken glass pane and the door damage on the penthouse was not present prior to the last wind event.

Wind events reported in 2013 and 2015 would not have caused this damage as these older events did not correlate with the timeline made by Ms. McKenzie. It is often the occurrence that we have to rely on the property owner for pertinent information in our analysis. Our review of the recent reported wind speeds identified a 56-mph wind on July 10, 2021 approximately 1.8 miles from the property. This wind speed was classified as damaging winds (those exceeding 50-60 mph) by NWS and sufficient to mobilize mechanical items and cause impact to the structure. The hail event episode narrative on August 16, 2020 approximately 0.6 miles west-southwest from the property reported severe wind and was closer than the July 10, 2021 event. According to the NWS wind threat definition, *to be considered severe, associated wind gusts must be 58 mph or greater*. Our review of the wind records on August 16, 2020, at the airport reporting station identified the greatest wind gust speed was 28 mph which shifted from the southwest to the east. This was not a strong wind report yet did have a correlation to the directional damage sustained at the property. This airport reporting station was 1.5 miles from the property and the hail report on August 16, 2020 with the severe wind ($\geq$ 58 mph) was 0.6 miles from the property indicating the closer report was more probable to have caused wind related damages.

During our inspection we identified the neighboring 1-story property to the east across South Washington Street had a section of parapet cap trim that was bent back along the south and west sides consistent with wind from the south. Wind speeds at a 6-story roof typically would have been greater at higher elevations due to a more unobstructed position. According to Google Maps™ historical imagery available at the time of this

report, the bent trim was noted in June of 2022 and the November of 2018 imagery did not have this bent trim which supports the bent trim resultant of wind occurred between these dates.

Therefore it is more likely than not that the wind damage that caused mobilization of the mechanical items that damaged the man door and broke the window pane on the penthouse was caused by severe (> 58 mph) wind gusts on August 16, 2020 as this was the closest report of wind and was correlative of the damage assessment timeline made by Ms. McKenzie and Google Maps™ historical imagery.

Based on the physical evidence observed and measured at the property, severe winds (≥ 58 mph) associated with the hail event on August 16, 2020 more likely than not caused physical damage and necessitated the repair/replacement of the damaged building components. The physical damage included wind borne debris that impacted the west facing side of the south penthouse and caused a broken window pane, indentations in the window frame and adjacent man door, and mechanical indentations in the cell tower conduit large run cover.

We recommend the following to repair the physical damages caused by wind and wind-borne debris impact: replacement of the east penthouse south-facing fire rated window frame and glass pane, the man door, and the conduit run covers.

<u>Metal</u>

Hailstones impacting metal panel surfaces can cause damage if they have sufficient size, hardness, impact velocity and angle of impact. If hailstones have these physical characteristics, they may cause structural or functional damage (punctures in the metal panels and/or separations and irreparable deformations at panel joints and ribs that compromise functionality) to the roof coverings and trims. Hailstones can also cause physical damage including indentations that depreciate the value of a component. Burnish marks and round impact indentations on metal surfaces at the property provide evidence of the dates and diameters of hail that impacted the site.

Burnish marks and spherical impact indentations on metal surfaces at the property provide evidence of the hail diameters that impacted the site. Additionally, the burnish mark splay and sides of the building impacted provide evidence of the directional hail that fell at the property from the north and the northwest. Recorded hail events in the locale provide insight to the hail sizes identified in the area and round impact burnish marks and dents provide confirmation into the diameter of hail that impacted a property. Burnish marks can remove the dirt and paint oxidation and typically will remain after a hail event for 1 to 2 years and provides the evidence of recent hail impact. The prevailing majority of hailstorms contain hailstones that are relatively small (less than 1.0 inches in diameter). The smaller hailstones can cause damage to crops and property, yet not to all roof systems. Recorded hail events in the locale provide insight to the hail sizes identified in the area and round impact spatter and dents provide confirmation into the diameter of hail that impacted a property. "*Diameters of indentations in formed galvanized steel, copper, and aluminum sheet metal are smaller than the diameters of impacting ice spheres.*" (Crenshaw, Koontz 2002). Evaluation of dents and burnish marks provides insight for an assessment of hail diameter and directional hailfall that has occurred at a given site.

According to (Petty 2013) ice ball impact studies, the size of hail versus the size of dent diameter was obtained for various appurtenance surfaces and impact angles. The majority of dents observed had an inner dent diameter of 1.0 inches in the 26 gage galvanized metal panels and could be extrapolated for hailstone diameters up to approximately 1.7 inches in diameter.

Our inspection of the metal surfaces revealed varied sizes of round hail-caused indentations up to 1.5 that physically damaged the metal panel surfaces including the metal panel awnings, heavy gage appurtenances, flashings, fire rated window frames and aluminum sill flashings, rigid ducts, air-conditioner covers, grills, and condenser fins, drive through signage cover, and gutter. The awnings were visible from the sidewalk and parking lot perspective, see further discussion of awnings below. The faded burnish marks coincident to the indentations were consistent with a large hail event that occurred within the past several years.

The spherical indentations found in the condenser fins were more predominantly from the north and west directions with dent diameters up to 1.5 inches. This would be consistent with hail up to 1.8 inches in diameter. Combing RTU coil fins obscure the historical damage to the units and once combed, make future combing difficult as the fins are thin and prone to breakage. Once broken, these fins cannot be combed again and must be replaced. Therefore, we recommend replacement of the dented RTU coil fins. The manufactured dates on the RTUs could not disseminate which reported hail date would have caused the damages.

Due to the indentation diameters and related large hail that can cause these dents, we focused on the reported large hail events that had diameters at 1.75 inches. Our weather research identified only 3 dates that had large hail diameters at 1.75 inches in diameter; May 22, 2011, March 31, 2013 and August 16, 2020. The other reported hail diameters were too small to have caused the majority of the large indentations. The hail diameter reported for these events was consistent with the size of the spherical indentations observed in metal components.

According to Google Earth™, historical imagery depicted a double duct system along the south side of the 1st story roof alcove was constructed between February 24, 2012 and November 16, 2013 indicating the hail that damaged this ducting was after the 2012 image. Historical imagery also depicted the ducting was not present on the north side of the 1st story roof alcove directly adjacent to the 2nd through 6th story building perimeter in the February 24, 2016 imagery and was not identified until the April 13, 2019 image. This dated the hail damage occurrence to this ducting after February of 2016.

Because burnish marks last for 1-2 years after a hail event, and the faded burnish marks were identified coincident to the large spherical indentations we concluded that the hail that caused the majority of large indentations was representative of the reported August 16, 2020 hail event. Further, the majority of large indentations were lightly soiled indicating a more recent hail event. If the hail impact that caused the indentations was from the 2011 or 2013 reported hail events, 9 to 11 years of exposure would have indentations with far more soiled conditions than what we identified on site. This places the only reported recent hail event with hail large enough to produce the dents with slight oxidation within the indentation was the August 16, 2020 hail event as corroborated by

our hail data review for the property and outlined in the **Weather Information** section of this report.

Based on the physical evidence observed and measured at the property, large damaging hail up to 1.8 inches in diameter associated with the reported hail event on August 16, 2020 more likely than not caused the most significant physical damage and necessitated the repair/replacement of the damaged metal components. The physical damage included spherical indentations in the RTU metal covers, grills, and condenser fins, rigid ducts, metal panel awnings, window frames, appurtenances, aluminum window sill coverings and trims, flashings, drive through signage cover, and gutters. The hail-caused indentations have reduced the value of these building components.

<u>Glazed Terra Cotta</u>

Laboratory testing for functional damage to various tile roofing materials from hail impacts indicates that the lower threshold for unsupported areas of clay tile was 1.75 inches in diameter. The terra cotta tiles used on the Colton Building were not installed as roofing materials; however, we utilized the threshold of damage to roofing as a determination of the plausibility of damage from hail. Terra cotta is similar to clay tile roofing in that the material is an enriched molded clay based medium mixed with sand or pulverized fired clay. The glazed surface provides protection from the elements and premature degradation of the underlying terra cotta structure. Identifying the extent of damage and repair methodology has been outlined in the National Parks Service Preservation Brief Number 7 (NPS 2009).

Our inspection revealed spherical fractures of the glazed surfaces up to 1.2 inches in diameter with spalled perimeters and arc fractures coincident to the impact on the terra cotta tiles consistent with hail. The observance of light fungal growth on the terra cotta surfaces was common to 1-2 years of exposure to the elements. We also identified fractures in the glazing and mortar placed within the exposed terra cotta surface consistent with impact and fracture during installation. These areas were not consistent with hail impact. We identified crazing or random cracks across the surface of the glazed terra cotta tiles and debonding of the glazing in various areas lacking any signature of impact. These areas were the result of seasonal effects and water migration past the glazing that had debonded and spalled the glazed surface from the terra cotta.

Exposed terra cotta to the elements will degrade the tiles and cause further damage. This upgrades the physical damage to a functional damage threshold as the useful life has been negatively affected. The building had several areas of an architectural band where the formed glazed terra cotta bricks and tiles had fractured causing separation which is a fall hazard to the public below. Leaving the exposed surfaces that were spalled by hail-caused impact will eventually lead to degradation and an eventual fall hazard, so we recommend damaged areas of glazing and terra cotta be repaired.

The hail-caused impacts were almost all similar in color and consistent with a recent hail event. Damages were consistent with hail up to 1.8 inches in diameter and were more likely than not from the August 16, 2020 hail event. Older hail events would have had greater exposure of the terra cotta and discoloration as well as fungal growth would have been more prominent.

Based on the physical evidence observed and measured at the property, large damaging hail up to 1.8 inches in diameter associated with the reported hail event on August 16, 2020 more likely than not caused the most significant functional damage and necessitated the repair/replacement of the damaged glazed terra cotta tiles. The functional damage included fractured and spalled glazing with exposure of the terra cotta. The hail-caused fractures have reduced the value of these building components, shortened the useful life, and create a potential fall hazard to the public below as the terra cotta is exposed and subject to deterioration.

Bitumen, GB BUR, and Mod-Bit

Flat roofs are typically sloped 0.25 to 0.5 inches per foot for positive drainage. These roofs are typically water tight as opposed to water-shedding assemblies like laminated shingle roofs or metal panel roofs. Both the GB BUR and polymer mod-bit assemblies were installed over flat areas. Bitumen with reinforcement layers was installed fully adhered over the parapets and parapet walls of the penthouses and 6-story roofs that constructed the full roof covering of the parapets. Polymer modified bitumen was installed on the perimeter vertical parapet walls and curbs of the 1-story portion and over the southeast corner roof and parapets at the storage building.

Hailstones impacting GB BUR, reinforced bitumen, and mod-bit membrane surfaces can cause damage if they have sufficient size, hardness, impact velocity and angle of impact. If hailstones have the requisite physical characteristics, they may cause structural damage to the surface, including bruises, fracture, or reinforcement damage, and/or major displacement of the covering. Hail with the same characteristics can also cause non-structural cosmetic burnish marks, including minor displacement of gravel, granules, dirt, or mold/mildew, on the surfaces.

Our inspection of the bitumen surfaces and mod-bit roofing membranes revealed spherical areas of discrete granule / asphalt displacement and exposed membrane fibers at multiple locations which were consistent with the expected result of larger impacts from hail greater than 1.5 inches in diameter. Damaging hail up to 1.8 inches in diameter, which was more likely than not associated with the hail event on August 16, 2020, resulted in functional and physical damage to the bitumen cover over the parapets and GB BUR, and mod-bit roof coverings. The functional damage included a reduced service life of the roof from 1 or more of the following: displaced granule and bitumen cover, exposed bitumen, exposed reinforcement, dented, bruised, and fractured reinforcement mat. The fractured surfaces had a dark bitumen exposure consistent with a recent hail event. The fractured surfaces exposed the underlying layers of bitumen and fractured fiber reinforcement were a breached condition where water had migrated past the bitumen surfaces resultant of the hail-caused penetrations. The physical damage included dents in the bitumen surfaces.

The hail diameter reported for this August 16, 2020, hail event was consistent with the size of the spherical indentations observed in metal and window components, spherical marks on the mod-bit roofing, and the isolated spherical fractures observed in bitumen coverings at the parapet walls, perimeter curbs, and field repairs.

The second most recent (and also one of the largest reported size) hail event identified was on March 31, 2013. Hail damage from this event and prior events would have left

heavily soiled indentations in the metal surfaces and 9 years of bitumen exposure would have deteriorated the bitumen and exposed reinforcement. The smaller hail events would not have damaged the glazed terra cotta tile parapet caps and projected wall coverings, and not caused damage to the bitumen coverings, mod-bit, or GB BUR coverings. Because of these reasons we did not consider the hail events with hailstones less than 1.75 inches in diameter and reported hail events prior to August 16, 2020.

The hail-caused bitumen fractures on the parapet walls and patched areas of the GB BUR indicate water migration past the roofing had occurred. This was confirmed on the walls by water stains at the base of the wall and near the flagpole with our Tramex™ moisture measurements at 23 percent adjacent to recent fractures in the bitumen. The best building practices and roofing manufactures indicate repairs and re-roofing cannot be done over wet roofing substrate. We did not core the roof during our investigation to determine the underlying substrate. The areas of GB BUR had indications of blistering within the roofing membrane; however, we could not conclusively determine from a visual inspection that the GB BUR was damaged as a direct result of the 1.8 inches in diameter hail. GB will deflect the energy from an impacting hailstone causing the dissipation of impact energy prior to damage of the BUR. Literature and laboratory testing suggests it typically takes the impact energy of a hailstone up to about 2.5 inches in diameter to damage a GB BUR. Our experience has shown that a BUR void of GB can be damaged by hail thresholds as small as 1.25 inches in diameter.

We also identified alligatored bitumen surfaces. This alligatored bitumen surface condition is caused by over exposure to heat and UV. If the bitumen evaporates from the petroleum-based roof system, it is less flexible resulting in surface damage that looks similar to an alligator's skin. This is not a hail-caused condition. The alligatored bitumen condition we identified was not a cause for roof replacement. Mechanical damage typically does not leave a spherical imprint on the roof surface.

The GB BUR was constructed over the north awnings. Awnings maintain a 2015 IBC definition of *an architectural projection that provides weather protection, identity or decoration and is partially or wholly supported by the building to which it is attached. An awning is comprised of a lightweight frame structure over which a covering is attached.* Further, a roof assembly is defined in the 2015 IBC as *a system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly includes the roof deck, vapor retarder, substrate or thermal barrier, insulation, vapor retarder and roof covering*. These definitions clearly show an awning has a differing connotation than a roof. According to the EMC endorsement: Limitations on Coverage for Roof Surfacing for policy number CP 10 36 10 12, "roof surfacing" was defined as *the shingles, tiles, cladding, metal or synthetic sheeting or similar materials covering the roof and includes all materials used in securing the roof surface and all materials applied to or under the roof surface for moisture protection, as well as roof flashing*. These EMC definitions entertain the roof covering and do not encompass an awning as defined by the 2015 IBC. The physical damages resultant of hail-caused impacts to the awnings, the awning coverings, and the moisture migration to the underside of the awnings should maintain repair based on the definition of the 2015 IBC.

Movement of the mod-bit surfaces by tactile manipulation indicated a bruised condition consistent with intermembrane ply fracture. The hail-caused impacts displaced the granule cover, exposed the bitumen, and in some locations bruised and exposed / fractured the mat reinforcing fibers, constituting physical and functional damage to the roofing system. The spherical areas of granular displacement were not severely degraded indicating the impact that caused the granular displacement was recent and not consistent with a 2011 or 2013 hail event. A granule coating application to the mod-bit roofing membrane would have been a feasible option for newer / more recently installed, non-saturated roofing systems; however, the aged mod-bit roof coverings at the property cannot be feasibly and effectively remediated via recoating. Additionally, there was water migration past the roof indicating a breached roofing surface and re-coating repairs cannot be constructed over a wet substrate. Replacement of the bitumen covering and mod-bit roof due to hail-related damage is required. If saturation is encountered in the GB BUR during replacement of the perimeter bitumen and mod-bit roofing this roofing will require replacement to the extent dry conditions are encountered.

The displaced granule mod-bit surfaces exposed to UV rays will eventually evaporate the bitumen, further exposing the reinforcement and shortening the useful life of the roofing membrane. According to Morrison (2009), regarding a polymer mod-bit roofing membrane, *A roof system's expected service life can be reduced when hail disrupts the membrane's protective surfacing and exposes its coating* bitumen.

Based on the physical evidence observed and measured at the property, large damaging hail up to 1.8 inches in diameter associated with the reported hail event on August 16, 2020 more likely than not caused structural damage to the bitumen, mod-bit, and BUR. The structural damage included a reduced service life of the roof from 1 or more of the following: displaced granule and bitumen cover, exposed bitumen, exposed reinforcement, dented, bruised, and fractured reinforcement mat, and breached condition of the roofs over the penthouses, 6th story and 1-story roofs. The fractured surfaces were a breached condition where water had migrated past the bitumen and mod-bit roofing membrane.

We recommend the following to repair the damage caused by hail impact: repair/replacement of the structurally damaged bitumen and mod-bit roofing surfaces. Extension of the repair should encompass areas of the GB BUR that were saturated to the extent dry conditions are encountered.

<u>TPO</u>

Hailstones impacting TPO roofing membranes can cause damage if they have sufficient size, hardness, impact velocity and angle of impact. If hailstones have the requisite physical characteristics, they may cause structural damage to the surface, including fracture of the membrane. Fractures over fasteners are typically arc shaped and referred to as anvil strikes. The underlayment can be damaged if the substrate covering is torn or fractured. Hail with the same characteristics can also cause non-structural cosmetic burnish marks, including minor displacement of the covering, dirt, or mold/mildew, on the surfaces.

Our inspection of the TPO roofing membrane over the bank teller drive through revealed no visible impact damage to this surface. The TPO membrane was installed over a very

hard substrate. The TPO roofing membrane had a manufactured date stamp of July of 2010. It has been our experience that hard substrates under newer TPO membranes provide better resilience to hail-caused impact than softer substrates that allow the TPO to deflect under the impact load. The TPO membrane appeared newer than a 12-year-old roof covering. We did note the spherical hail-caused indentations to the signage panel cover adjacent to the TPO roofing membrane.

Based on the physical evidence observed and measured at the property, there was no damage to the TPO roofing membrane.

<u>Interior</u>

Our limited inspection of the interior of the building revealed water stains on the concrete ceiling and walls in the penthouses. The water stains were the result of water migration past the hail breached bitumen roofing at the perimeter of the penthouse parapet. Water migration likely occurred under the center of the roof from the weight of the cell towers, frames, and CMU block placement on 4x4 sleepers that were not protected over the gravel ballast. We identified numerous areas of water migration on the 6th floor, the majority along the perimeter of the building, consistent with the functionally damaged perimeter bitumen on the walls, on the penthouse walls, and on the flat repaired sections of BUR. This water damage affected the paint on the concrete roof deck, light fixtures, wall paneling, trims, desk tops, and floor coverings. The water damage in the hall and office areas of the bank were below roof deck penetrations and could not be traced back to a weather caused opening. Further investigation would be required with destructive testing to determine the cause of these water-stained areas. Water damage to the wall finishes at the northwest corner of the bank could not be traced back to a weather created opening. If this were from the parapet wall at the 6th story roof, it would be expected that water damage would exist down each floor in this corner and that was not the reported case. Further inspection would be required to make a determination as to the source of this water damage.

Based on the physical evidence observed and measured at the property, water damage to the penthouses and 6th floor offices was the direct result of the weather event on August 16, 2020. Water migration past the roof coverings occurred through the weather caused impact penetrations. The water damage on the 1st floor bank and bank offices, hall, and bank filing room could not be definitively traced back to a weather created opening.

We recommend, as a result of the water migration through weather caused breached roof coverings, a paint application of the concrete roof deck, replacement of water damaged light fixtures and electrical outlets, replacement of damaged wall and floor coverings, cleaning and or replacement of affected built in cabinetry, and drywall.

Review of the Engineering Inc. Inspection Report

According to the Engineering Inc. Inspection report on page 3, the purpose for their inspection was *to determine the existence of, and if found, the extents of storm damage to the building and roof as a result of high winds and/or hail*.

Engineering Inc. reported (page 5), *no wind related damage was observed to the exterior of the building*. This was contrary to our findings. Engineering Inc. did not include a

review of wind data in their inspection report or any discussion of the wind damage to the penthouse or conduit line covers.

Weather research conducted by Engineering Inc. (page 32) referenced inclusion of the NWS *and Hail Verification Report #16011165 produced by Corelogic Spatial Solutions, LLC*. According to Engineering Inc. research, at the Colston Building location *hail 1.0" in diameter or larger, an accepted minimum for creating damage to the most susceptible building components, may have occurred on August 16, 2020 (1.0 in. diameter) and April 21, 2020 (1.0" diameter). And prior to that not since May 22, 2011 (1.4 in diameter)*. The referenced hail data from NWS and Corelogic© hail verification report was not attached to the Engineering Inc. Inspection Report. Engineering Inc. reported no evidence of hail events from May 23, 2011 through April 20, 2020 at the property. This was likely due to Engineering Inc. not mapping out the hail in reference to the property location and reliance on their CoreLogic© reporting. Engineering Inc. overlooked the more recent 1.0 inches to 1.75 inches in diameter hail events reported by NWS from March 31, 2013 to June 23, 2017. We had deducted these hail events based on the diameter size and condition of the majority of hail impacted sites.

According to Verhulst, Bosley, Talbott (2018), within 3 miles of a hail impacted site, field estimates of hail diameters were found to be within 0.5 inches (above or below) of NOAA database (NCEI/SPC) weather reports with a 74 percent accuracy. This dropped to 70 percent using the NWS hail swath data. Fee-based reports were only 51 percent to 61 percent accurate. *Therefore, the data showed that spotter-based reports from NOAA databases* (NCEI/SPC) *within approximately 3 miles from the site/building provided the best correlation with field estimates of hail size*. The CoreLogic® report indicated hail at the site differed in diameter and dates from the NCEI and NWS reports.

Engineering Inc. did not include their weather research data in the report we had obtained, consequently the *hail 1.0" in diameter or larger* could not be confirmed what the "larger" diameters of hail were. Additionally, Engineering Inc. indicated this hail diameter *may have occurred on August 16, 2020*. Site evaluation is key to determine the diameter of hail that occurred at the site. The diameter of hail damage, extent of damage to the roofing surfaces and components, and the condition of the indentations all provide evidence of the diameter of hail and date that hail occurred at the site. Once this information is determined and measured, a storm event that caused this damage more likely than not is identified from the NCEI and NWS weather data.

Our weather research findings identified a hail event on August 20, 2020, yet no hail occurrence within 2.0 miles of the property on April 21, 2020. NWS had no report of hail on April 21, 2020, so we do not agree with Engineering Inc. that a hail event occurred at the property on this date. Hail events that occurred in 2011 would have had a heavily soiled condition in the indentations after 12 years so we do not agree that this date was a contributing storm at the property.

Engineering Inc. Inspection Report on page 14 acknowledged the presence of *hail related dents…in the small air conditioning condenser fins on several of the roof top units*. We concur but found hail-caused indentations to the majority of the units covers, fan grills, and condenser fins including the larger units on the 1st story roof. Engineering Inc. further indicated *Older hail related dents were chalked on some of the metal HVAC ducts…but*

these were older and consistent with the age of the building. The building was over 100 years old and the mechanical ducts were not present throughout the entire age of the building. Further, historical imagery clearly depicted many of the ducts were altered or installed post the earlier hail occurrences. Engineering Inc. reported *upon examination these impacted areas suggested that recent hail at this location was smaller and not likely to damage the roof or parapet coverings*. We concur that the damaging hail was recent yet disagree that the hail was smaller. Recent hail caused shiny spherical indentations in metal condenser fins and rigid ducts up to 1.5 inches in diameter necessitated hail stones up to 1.8 inches in diameter. Hail at this magnitude would cause damgae to bitumen, BUR, and mod-bit surfaces.

Engineering Inc. acknowledged hail related dents to the north and west aluminum window sills yet did not acknowledge the hail-caused damages to the fire rated window frames on the building visible from the 1st story roof.

Engineering Inc. Inspection Report on page 27 depicted only the "chip" fractures that were caused by installation practices and filled with mortar, and the delamination of the glazing. This provided a skewed perception of the condition of the glazed terracotta tiles. Engineering Inc. Inspection Report on page 32 statement *no storm related damage was noted…to the glazed terra cotta*, was contrary to our findings. Based on the condition of the spherical spalled glazing, impact condition, and exposed terra cotta coincident to the impact with slight fungal growth, these hail-caused impacts were in place at the time of Engineering Inc's inspection.

Engineering Inc. Inspection Report on page 14 cited *no hail-caused cracks, scuffs or dents were observed on any of the parapet or equipment curb faces* was contrary to our findings where spherical impact marks had fractured the bitumen coverings and reinforcement mat. Engineering Inc. further reported in regard to the mod-bit covering on the 1-story storage building *older foot traffic scuffs and wear and tear of the membrane surface was identified, but no localized impacts associated with hail hits or strikes were noted*. We concur that there were random linear scuffs consistent with foot traffic; however, there were clearly identified hail-caused impact marks that displaced granule cover and exposed the bitumen. Several locations in the Engineering Inc. Inspection Report, there was reference to a 3-ply built up bituminous roof system yet no report or depiction of a core sample to determine the roof composition.

Engineering Inc. Inspection Report on page 33 concluded the only storm damage to this building was *hail damage to cooling fins on some of the small roof top air conditioning condenser units on the upper and lower roofs* and *to the cooling fins on a large sized roof top air conditioning condenser unit on the lower roof*. We categorically disagree with this conclusion as our reported findings definitively showed otherwise, that there was far more storm damage to the building than that reported by Engineering Inc.

Scope of Repairs

We recommend as a result of the wind-borne debris impact damage from the August 16, 2020 storm event the following be removed and replaced: The fire rated window frame and window pane and the man door on the west-facing side of the south penthouse and the covers on the cell tower conduit run.

We recommend as a result of the hail-caused impact damage from the August 16, 2020 storm event the following be removed and replaced:

- Replacement of the physically damaged rigid ducts, metal panel awnings, heavy gage appurtenances, flashings, fire rated window frames, aluminum window sill coverings and trims, flashings, drive through signage cover, and gutter. A portion of the flashing replacement will require removal and replacement of the marble cladding. Consult with an HVAC technician and follow recommendations for the repair or replacement of the HVAC components.
- Repair/replacement of the hail-caused physically damaged glazed terra cotta tiles. Consult with a qualified expert and follow recommendations for the repair or replacement of the damaged components. Following the stipulations in NPS 2009 recommendations or The Preservation of Historic Glazed Architectural Terra-Cotta Preservation Briefs: 7 will provide repair/replacement direction. Additionally, the Ardmore Historic Commercial District may have requirements for preservation of the Colston Building.
- Replacement of the structurally damaged bitumen and mod-bit roofing surfaces. This will require removal of the bitumen and mesh coverings on the existing parapets and bitumen repairs on the GB BUR. Additionally, assessment of the GB BUR roofing systems for water damage is necessary and should include replacement of damaged underlying roofing system components, such as water-damaged underlayment and compromised roof decking, down to the concrete deck where applicable

We recommend as a result of the water migration through weather caused breached roof coverings the following be removed and replaced:

- Paint application of the concrete roof deck, replacement of damaged light fixtures and electrical outlets, replacement of wall and floor coverings, cleaning and or replacement of affected built in cabinetry, and drywall on the 6th floor offices.

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My qualifications are noted in our attached CV and over a decade of construction experience. Additionally, within my CV is a list of all cases where we have provided expert testimony in trial or by deposition. Charges for my professional services on this project are conducted according to our attached 2022 and 2023 rate schedules.

Representative photographs are located in the **Attachments** section of this report. Photographs that were taken during the inspection but not included in the report are stored in our files and available upon request.

This report was prepared by B-Hill Consulting Engineers for the exclusive use of Pendant Properties, LLC, and their representatives. Any other use is prohibited without the written consent of Pendant Properties, LLC, their representatives, and B-Hill Consulting Engineers. The opinions are based on information available at the time of the review and preparation of this report, experience, education, work performed, industry resources, engineering references, and other information acquired and listed in the Reference Information section of this report. The professional determinations presented in this report have been developed using that degree of care and skill ordinarily exercised under

similar circumstances by professional engineers practicing in this locality. Aside from this standard, no warranty, either expressed or implied, is made as to the professional determinations expressed in this report. Should additional information or unknown conditions be uncovered or made available, B-Hill Consulting Engineers retains the right to amend and supplement this report accordingly. It is understood that B-Hill Consulting Engineers is not responsible or liable for the accuracy or adequacy of a design performed by others, and that the responsibility for the original construction rests with the General Contractor, and the design professional who appears on the approved construction documents.

In addition, this report is a general summary of writings, recordings, photographs, and other information, which is available for review and placed within the job file. To the extent assumptions were made relating to the contents of this report, they are based on sound engineering judgment and not all such assumptions are stated within this report or in our job file.

Reference Information

We reviewed and considered the following references and information when preparing this report.

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5) ASTM D3746-85 (2015). *Standard Test Method for Impact Resistance of Bituminous Roofing Systems*, American Society for Testing and Materials (ASTM) reapproved 2015.

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18) Morrison, Scott J., P.E., (2009). *Holy Hail*, Professional Roofing, June 2009.

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20) NPS (2009). *Preservation Brief No. 7. Terra Cotta Repair*. National Parks Service (NPS) Originally published in "Exceptional Places" Volume 4, 2009 a newsletter of the division of Cultural Resources, Midwest Region by Mark Chavez

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